

Economic Analysis of Water Quality Based Effluent Limits for the City of Hamilton WWTP

EPA has requested an economic analysis of water quality based effluent limits for nutrients for the City of Hamilton wastewater treatment plant (WWTP), based on EPA Guidance and practice, and data availability. Abt Associates conducted a preliminary analysis consistent with EPA's Interim Economic Guidance for Water Quality Standards (U.S. EPA, 1995), and publicly available data. We present a summary of the analysis and our conclusions below. Since we limited our review to the economic analysis, we did not review the appropriateness of the water quality targets and resulting effluent limitations, or other potential bases for a variance.

1 Background

The City of Hamilton WWTP is an extended aeration activated sludge system that includes the following equipment: bar screen, influent sampler, anoxic selector basin, oxidation ditch with rotating brush aerators, dissolved air flotation tank, three clarifiers, chlorine contact basin, and solids handling facility with two aerobic digesters (Montana DEQ, 2011). Based on recent discharge monitoring report (DMR) data, nutrients in the facility's discharges have been as high as 11 milligrams per liter (mg/L) total nitrogen (TN) and 5.55 mg/L total phosphorus (TP). Future average monthly limits for the facility would be 4.2 mg/L TN and 1.3 mg/L TP. Therefore, the facility could require upgrades to comply with the new limits.

2 Estimating Costs

We developed a preliminary estimate of incremental compliance costs to reach these permit limits using a Water Environment Research Foundation (WERF) report (WERF, 2011) that provides estimates of costs for hypothetical treatment trains providing various levels of nutrient removal. Specifically, Table 4-3 of WERF (2011) provides unit cost data that are based on flow (e.g., dollars per gallon per day capacity) for each of several levels of treatment. The WERF treatment levels are designed to meet the nutrient limits shown in Exhibit 2-1.

Exhibit 2-1: WERF (2011) Treatment Level Objectives

Level	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)
1	No removal	No removal
2	8	1
3	4 to 8	0.1 to 0.3
4	3	0.1
5	<2	<0.02

In a previous economic analysis (Blend and Suplee, 2011), the Montana Department of Environmental Quality (DEQ) categorized the City of Hamilton WWTP as WERF level 2. Based on the available information, however, the existing facility includes some, but not all, of the

nutrient removal equipment required for WERF level 2.¹ Also, based on the DMR data, the facility has not consistently met the nutrient limits associated with a level 2 treatment train. Therefore, for this analysis, we assume the existing equipment at the facility is equivalent to WERF's level 1 treatment train, even though the facility does include some of the equipment required for WERF level 2.² Thus, WERF level 1 costs are likely to be a low-end estimate of the value of the existing nutrient removal equipment at the facility.³

The facility's permit fact sheet (Montana DEQ, 2011) reports a design flow average of 1.984 million gallons per day (MGD) and a peak design flow of 2.728 MGD. It reports an actual average flow of 0.7 MGD for the period January 2006 through October 2010.⁴ For this analysis, we use the design flow average of 1.984 MGD to estimate capital costs because the WERF capital estimates are scaled to an annual average design flow.⁵ We use the actual average flow of 0.7 MGD to estimate operating costs because long-term ongoing operating requirements are most likely to reflect this flow.

For level 1 treatment, WERF (2011) estimates capital costs of \$9.3 million per million gallons per day (MGD) capacity and operations cost of \$250 per million gallons treated. Applying these costs to the design and average flow for Hamilton results in a total capital cost of \$18.45 million and an operating cost of approximately \$63,900 per year (assuming year-round operation). We used the Engineering News Record (ENR) construction cost index (CCI) to escalate capital costs to current dollars by multiplying by 1.08.⁶ Because WERF's operating costs are based on energy and chemical costs, we used the consumer price index (CPI) to escalate operating costs to current dollars by multiplying by 1.05.⁷ This escalation results in a total capital cost of \$19.95 million and an operating cost of approximately \$67,200 per year in current year dollars.

To meet a future nutrient limit of 4.2 mg/L TN would require treatment corresponding to WERF level 3 or level 4. We assumed that level 4 treatment would be required to guarantee meeting the future nutrient limits, allowing for a safety factor. This level of treatment would also meet a

¹ Specifically, the facility includes an anoxic selector basin, but does not appear to include an anaerobic zone or mixed liquor return.

² Other minor differences between the existing treatment train and WERF level 1 include that the facility uses aerobic, instead of anaerobic, sludge digestion. The method used here to calculate incremental compliance costs effectively "nets out" the costs of sludge digestion portion of the treatment train. Therefore, this minor difference is not expected to have a significant impact on the cost estimates.

³ As a result, the incremental cost estimates presented here are conservative and may overestimate potential costs.

⁴ The City's wastewater plan (City of Hamilton, 2006) projects increasing average flows. The analysis here does not account for these anticipated future increases in flow because the projections are speculative.

⁵ The WERF estimates also assume a peaking factor of 3. In comparison, based on the reported design average and peak flows, the existing Hamilton facility appears to be designed for a peaking factor of approximately 1.4. If facility upgrades were designed using this lower peaking factor, the cost estimates here would overestimate actual costs.

⁶ The average ENR CCI for 2014 was 9806 and the average ENR CCI for 2011 was 9070, resulting in an escalation factor of $9806 / 9070 = 1.08$.

⁷ The CPI for 2014 was 236.736 and the average CPI for 2011 was 224.939, resulting in an escalation factor of $236.736 / 224.939 = 1.05$.

future nutrient limit of 1.3 mg/L TP. For level 4 treatment, WERF (2011) estimates capital costs of \$15.3 million per MGD capacity and operations cost of \$880 per million gallons treated. Applying these costs to the design and average flow for Hamilton results in a total capital cost of \$30.36 million and an operating cost of approximately \$224,800 per year (assuming year-round operation). Applying the escalation factors discussed above results in a total capital cost of \$32.82 million and an operations cost of approximately \$236,600 per year in current year dollars.

The incremental capital cost for upgrading from WERF level 1 treatment, which the Hamilton facility appears to resemble, to WERF level 4 treatment, which would be required to meet the future limits, would be \$32.82 million – \$19.95 million = \$12.87 million. The incremental difference in operating costs between WERF level 1 and WERF level 4 would be \$236,600 - \$67,200 = \$169,400 per year.

The WERF (2011) unit operating costs include energy and chemical costs only, not labor. Although incremental labor requirements can be minimized when automated controls are present, labor costs can be highly dependent on site-specific factors (U.S. EPA, 2008). For conventional activated sludge treatment as a whole, however, estimated labor costs can be as much as two-thirds of total annual operating costs (Young et al., 2012). Therefore, to account for potential incremental labor, we multiplied the incremental operating cost by three to \$508,200 per year. Note that this incremental operating cost assumes year-round operation. Actual incremental operating costs would be lower if the nutrient criteria do not apply year-round and if elements of the upgraded treatment system could be shut down, bypassed, or placed on standby during the period when the criteria do not apply.

We annualized incremental capital costs over 20 years using an interest rate for revenue bonds of 2.5%, which is the current rate for the Montana Water Pollution Control State Revolving Fund (Montana DEQ, 2015). We added the incremental operating costs, including labor, to arrive at a total annualized cost of \$1,333,774 per year.

For purposes of sensitivity and uncertainty analysis, we also examined the impact of alternative assumptions used in Montana DEQ's previous economic analysis. Montana DEQ's previous analysis examined various scenarios that included two different interest rates: 5% and 7%. The previous analysis also used a different method to estimate labor costs. Instead of applying a multiplier to annual operating costs, it estimated labor costs as a percentage of annualized capital costs. The scenarios examined used two different labor percentages: 15% and 48%.⁸

Based on the range of scenarios examined in Montana DEQ's previous analysis, we calculated results using two sets of alternative assumptions. Alternative 1 combines the lower interest rate of 5% with the lower labor estimate of 15% of annualized capital cost. Alternative 2 uses the

⁸ Montana DEQ's previous analysis also examined different assumptions about the percent of flow treated by reverse osmosis. Because meeting future nutrient limits at this facility would not require reverse osmosis, those assumptions have no effect on the analysis here.

higher interest rate of 7% and the higher labor estimate of 48% of annualized capital cost. Exhibit 2-2 compares our cost estimates with results using these alternative assumptions.

Exhibit 2-2: Comparison of Standard and Alternative Cost Estimates

Scenario	Interest Rate	Labor	Total Annualized Cost (\$/year)
Standard	2.5%	2/3 of total operating cost	\$1,333,774
Alternative 1	5%	15% of annualized capital cost	\$1,357,022
Alternative 2	7%	48% of annualized capital cost	\$1,967,337

3 Municipal Preliminary Screener

To demonstrate that the costs of pollution control would result in substantial and widespread economic and social impacts justifying a variance, the discharger must first demonstrate that it would face substantial financial impacts through a two-part test, including a municipal preliminary screener (MPS) and Secondary Test.

The first step in determining whether impacts will be substantial involves combining the estimated compliance costs with existing pollution control costs, and comparing the result (on a per-household cost basis) to median household income (MHI) to obtain an MPS value. Exhibit 3-1 shows the assumptions and data sources for the MPS calculation.

In calculating the MPS, we assume that Hamilton will fund the project through the Montana State Revolving Fund, and that it will not obtain grants. This may overestimate costs if the City is able to finance some portion of project costs using grants, as it has for previous projects.⁹ Information from the City's Annual Financial Report (City of Hamilton, 2015) and provided by the City's Utility Billing Clerk (Ellingson, 2015) indicates that residents currently bear 34.8% of user charges for wastewater services.¹⁰ We assume that households would bear the same share of project costs, and that commercial users will cover the remaining 65.2% of project costs.

Based on the assumptions and data shown in Exhibit 3-1, we calculate that the project could result in an MPS of 2.2%. Using the alternative interest rates, labor costs, and annual project costs shown in Exhibit 2-2 (and all other assumptions the same as Exhibit 3-1), the MPS would be 2.2% (Alternative 1) or 2.7% (Alternative 2).

Based on EPA's 1995 Guidance, this indicates that the project may result in substantial economic impacts, and a Secondary Test is appropriate.

Exhibit 3-1: Municipal Preliminary Screener for the City of Hamilton

⁹ For example, wastewater plant improvements for fiscal year 2013-2014 were primarily funded by grants, including a Community Development Block Grant, a grant from the Montana Department of Natural Resources and Conservation Renewable Resource Grant and Loan program, and a grant from the Treasure State Endowment Program (City of Hamilton, 2015).

¹⁰ The City of Hamilton (2015) indicates that there were \$1.075 million in total revenues in 2014, and Ellingson (2015) states that \$373,705 comes from residential users.

Variable	Estimate	Data Source
Capital costs	\$12.87 million	See Section 2
Annual O&M costs (electricity, chemicals, and labor)	\$508,200	See Section 2
Interest rate for revenue bonds (for annualizing capital costs)	2.5%	Current interest rate for Montana Water Pollution Control State Revolving Fund (Montana DEQ, 2015)
Time period of financing (for annualizing capital costs)	20 years	
Annual project costs	\$1,333,774	Annualized capital plus annual O&M
Total annual cost of existing controls	\$1,075,000	City of Hamilton (2015)
Amount of annual existing costs paid by households	\$373,705	Ellingson (2015)
Share of annual existing and project costs paid by households	34.8%	Amount of annual existing costs paid by households divided by total annual cost of existing controls ¹
Number of households served	1,489	Ellingson (2015)
Existing annual per-household costs	\$251	Amount of existing costs paid by households divided by number of households
Amount of annual project costs to be paid by households	\$464,153	Total annual project costs times the share of annual existing and project costs paid by households
Annual per-household pollution control project cost	\$312	Household share of annual costs divided by number of households
Total annual cost of pollution control per household	\$563	Household existing costs plus project costs
Median Household Income (2013\$)	\$25,608	U.S. Census Bureau (2013b)
Median Household Income (2014\$)	\$26,023	Adjusted based on Consumer Price Index (2014=236.74; 2013=232.96)
Municipal Preliminary Screener (MPS)	2.2%	Total annual cost of pollution control divided by median household income
Alternative 1 MPS ²	2.2%	
Alternative 2 MPS ³	2.7%	
O&M = operations and maintenance		
1. We assume that households will pay for new project costs in the same proportion that they pay existing costs.		
2. Alternative 1 assumes an annual project cost of \$1,357,022 (Exhibit 2-2), which yields annual per-household project costs of \$317 (\$1,357,022 times the share of costs to be borne by households, divided by the number of households) and total annual household costs of \$568 (annual household project costs plus existing annual household costs).		
3. Alternative 2 assumes an annual project cost of \$1,967,337 (Exhibit 2-2), which yields annual per-household project costs of \$460 (\$1,967,337 times the share of costs to be borne by households, divided by the number of households) and total annual household costs of \$711 (annual household project costs plus existing annual household costs).		

4 Secondary Test

If the MPS indicates that the economic effects of the pollution control project may be substantial (with a borderline impact being between 1% and 2% and a large impact being over 2%), the next step is to use the Secondary Test to evaluate the community's ability to obtain financing as well

as general socioeconomic health. The Secondary Test is designed to build upon the characterization of the financial burden identified in the MPS. Indicators describe pre-compliance debt, socioeconomic, and financial management conditions in the community. For more information on the need for the Secondary Test, see the Appendix and U.S. EPA (1995).

Section 4.1 shows the Secondary Test for Hamilton using U.S. EPA (1995) and Section 4.2 shows Montana's alternative Secondary Test (Montana DEQ, 2014), which eliminates debt and financial management indicators in favor of socioeconomic indicators. For more details on Montana's modified Secondary Test, see Exhibit 4-1 and Section 4.2.

Exhibit 4-1. Comparison of EPA 1995 Guidance and MT DEQ Guidance: Secondary Test of Substantial Impact, Public Entities

EPA Indicator	Interpretation	MT DEQ Indicator
<i>Debt Indicators</i>		
Bond Rating	Indicates the community's credit capacity.	None
Overall Net Debt as a Percent of Full Market Value of Taxable Property	Indicates the debt burden on residents and measures the ability of the community to issue additional debt.	None
<i>Socioeconomic Indicators</i>		
Unemployment Rate	Indicates the general economic health of the community.	Unemployment Rate
Median Household Income	Indicates overall wealth of the community.	Median Household Income Poverty rate ^a LMI percentage rate ^b
<i>Financial Management Indicators</i>		
Property Tax Revenue as a Percent of Full Market Value of Taxable Property	Indicates the funding capacity to support new expenditures, based on the wealth of the community.	(Property Tax + Fees + Revenues)/MHI/Population × 100 ^c
Property Tax Collection Rate	Indicates the efficiency of the tax collection system and measures how well the local government is administered.	None
<p>a. Evaluated as follows: strong: < 6%; midrange: 6% to 40%; and weak: >40%.</p> <p>b. Low to medium income (LMI) percentage rate, defined as the percent of population earning 200% of the poverty threshold or below. Evaluated as follows: strong: < 10%; midrange: 10% - 45%; weak: >45%.</p> <p>c. Evaluated as follows: strong: <1.5; midrange: 1.5 – 3.5; weak: >3.5.</p>		

4.1 Secondary Test Based on EPA Guidance

To conduct the Secondary Test for Hamilton using U.S. EPA (1995) Guidance, we used socioeconomic data from the U.S. Census Bureau (2013a; 2013b; 2013c), information about property values from Montana Department of Revenue (2015), and other financial data from Hamilton's 2014 Annual Financial Report (AFR; City of Hamilton, 2015).

Debt Indicators

Debt indicators include the bond rating, which provides a measure of the creditworthiness of the community, and the overall net debt as a percent of the full market value of taxable property, which is a measure of the debt burden on residents in the community and a measure of the ability of local government jurisdictions to issue additional debt.

We did not find a bond rating for the City of Hamilton. As noted by U.S. EPA (1995), the absence of a bond rating does not indicate strong or weak financial health. Consistent with U.S. EPA (1995), we excluded this metric from the calculation of the Secondary Score.

The 2014 AFR shows \$1,270,000 in outstanding bonds payable; these bonds are for street improvements, and are paid by special assessments. The AFR does not report any overlapping debt (such as for a school district or other overlapping entity).¹¹ The 2015 Certified Taxable Valuation (Montana Department of Revenue, 2015) shows that the 2015 total market value was \$537,315,927. Based on this, the overall net debt as a percent of full market value of taxable property is 0.2%.

However, this calculation does not fully reflect the amount of debt owed by the community, nor its potential ability to issue additional debt. The City also has \$1,784,000 in long-term debt for sewer and water systems (City of Hamilton, 2015), which are repaid with service fees. Although this debt is not repaid by property taxes, it impacts the community's ability to take on debt, which is the purpose of this indicator. Had this additional debt been financed via general obligation bonds rather than revenue bonds, for example, it would be repaid via property taxes and included in the debt used for this indicator. Including both types of debt would result in overall net debt as a percent of full market value of taxable property of 0.6% (although full market value of taxable property is not necessarily the appropriate comparison for both types of debt). As such, the City is still below 2% on this metric, which is considered "strong" based on U.S. EPA's 1995 Guidance.¹²

Socioeconomic Indicators

Socioeconomic indicators include community-specific MHI (compared with the state level MHI) and the local unemployment rate (compared with the national rate). As shown in Exhibit 3-1, MHI for Hamilton for the period 2009 to 2013 was \$25,608. Data from the U.S. Census Bureau (2013b) indicates that MHI for Montana during the same period was \$46,230.¹³ Since the City's MHI is more than 10% below the state MHI, the City is weak on this indicator.

¹¹ The Hamilton School District issued \$7,635,000 in general obligation bonds in 2009, which are expected to mature in 2018. Additionally, the District's Annual Report (Hamilton Public School District, 2014) reports \$1,070,353 in expected debt service expenditures for 2015. As such, we expect that the District's debt is not zero.

¹² If overlapping debt is more than \$7,692,318 (and the water and sewer debt is included) then total debt would exceed 2% of the total market value of taxable property and the City would be mid-range on this metric rather than strong. See footnotes on Exhibit 4-3 for additional information about the impacts to the Secondary Score.

¹³ Income is not updated to current dollar years for the Secondary Test.

According to the United States Bureau of Labor Statistics, unemployment in Ravalli County was at 4.9% in June 2015, compared with a national unemployment rate of 5.3%. Since the local rate is within 1% of the national rate, the City is mid-range on this indicator.

Financial Management Indicators

Financial management indicators include the property tax revenues as a percent of full market value of taxable property (“property tax burden”) and property tax collection rate. Property tax burden indicates the funding capacity to support new expenditures, based on the wealth of the community, while the property tax collection rate provides an indicator of the efficiency of the tax collection system and a measure of how well the local government is administered.

According to the AFR (City of Hamilton, 2015), property tax revenues for 2014 were \$1,833,998.¹⁴ As a share of the full market value of taxable property (\$537,315,927), property tax revenues are 0.3%. Since this is below 2%, the City is strong on the property tax burden metric. However, as with the debt indicator discussed above, debt for wastewater projects may not necessarily be repaid by property taxes (e.g., it is likely repaid by service fees), and this metric may not fully reflect the community’s ability to support new expenditures.

The AFR provides information for the property tax collection rate for the fiscal year 2014. U.S. EPA (1995) defines the property tax collection rate as the ratio of the actual amount collected from property taxes to the amount levied. However, the amount levied for the City of Hamilton is not available in the AFR; as such, we used the ratio of the actual amount collected to the final amount budgeted.¹⁵ For fiscal year 2014, the final amount budgeted for the general fund and special funds was \$1,818,558, while the actual amount collected for those funds was \$1,833,998, for a collection rate of 100.8%. As such, the City is strong on this indicator.

Secondary Test Data and Results

Exhibit 4-2 shows available data for the Secondary Test and Exhibit 4-3 provides the Secondary Score.

Exhibit 4-2: Secondary Test Data Based on EPA Guidance

Variable	Value	Data Source
Number of Households	1,489	see Exhibit 3-1
Median Household Income (2013\$)	\$25,608	see Exhibit 3-1
State Median Household Income	\$46,230	U.S. Census Bureau (2013b)
Community unemployment rate	4.9%	June 2015 unemployment rate for Ravalli County from Bureau of Labor Statistics
National unemployment rate	5.3%	June 2015 unemployment rate for United States from Bureau of Labor Statistics
Market value of taxable property	\$537,315,927	2015 Total Market Value from the Montana Department of Revenue (2015)

¹⁴ Including \$1,043,632 in the general fund and \$790,366 in non-major special funds.

¹⁵ City of Hamilton (2015) provides both the original budgeted amount and the final budgeted amount.

Property tax collection rate	100.8%	Actual property tax collection for general and non-major funds (\$1,833,997) divided by final budgeted amount for those funds (\$1,818,558) from City of Hamilton (2015) ¹
Direct net debt	\$3,054,000	Revenue bond balance and Special Assessment bond balance from City of Hamilton (2015)
Overlapping debt	\$0	None listed in City of Hamilton (2015)
Property tax revenues	\$1,833,998	Actual property tax collection for general and non-major funds from City of Hamilton (2015)
1. The 1995 Guidance defines the property tax collection rate as the ratio of the actual amount collected from property taxes to the amount levied. However, the amount levied for the City of Hamilton is not available; as such, we used the ratio of the actual amount collected to the final amount budgeted.		

Exhibit 4-3: Secondary Score Based on EPA Guidance

Indicator	Result	Score
Bond Rating	Not Available	n/a
Overall Net Debt as Percent of Full Market Value of Taxable Property	0.6%	3
Unemployment	4.9% [compared to 5.3% nationally]	2
Median Household Income ¹	\$25,608 [compared to \$46,230 statewide]	1
Property Tax Revenues as a Percent of Full Market Value of Taxable Property	0.3%	3
Property Tax Collection Rate	100.8%	3
Average of Financial Management Indicators ²	$(3 + 3) \div 2$	3
Secondary Score^{3,4}		2.3
Source: See Exhibit 4-2.		
1. Not updated for the Secondary Test.		
2. If one of the debt or socioeconomic indicators is not available (in this case, the bond rating), the two financial management indicators (property tax revenues as a percent of full market value of taxable property and property tax collection rate) are averaged and this averaged value is used as a single indicator with the remaining indicators.		
3. Average of scores for the following indicators: Overall net debt as a percent of full market value of taxable property, unemployment, median household income, and average of financial management indicators.		
4. If overlapping debt is more than \$7,692,318, then overall debt would exceed 2% of the market value of taxable property, the City would have a score of 2 rather than 3 on the “overall net debt as a percent of full market value of taxable property” metric, and the Secondary Score would be 2.0 rather than 2.3.		

4.2 Secondary Test Based on Montana Alternative

In comparison with EPA’s 1995 Guidance Secondary Test, the Montana DEQ (see Montana DEQ, 2014) has modified the Secondary Test such that much of the financial and debt information is not considered (eliminating both debt indicators in favor of socioeconomic indicators, and eliminating or altering both financial management indicators), but more

information on household income is provided.¹⁶ Exhibit 4-4 shows the metrics and interpretation using Montana’s alternative approach. This section calculates the Secondary Score based on Montana’s alternative approach.

Exhibit 4-4. Secondary Test Based on Montana DEQ Guidance

Indicator	Weak (Score of 1)	Mid-Range (Score of 2)	Strong (Score of 3)
Poverty Rate	More than 40%	6 to 40%	Less than 6%
Low to Medium Income Percentage (LMI)	More than 45%	10 to 45%	Less than 10%
Unemployment	More than 1% above state average	State average	More than 1% below state average
Median Household Income	More than 10% below state median	State median	More than 10% above State median
Property Tax, fees and revenues ¹ divided by MHI and indexed by population	More than 3.5	1.5 to 3.0	Less than 1.5
1. The “property tax, fees, and revenues” metric includes the following items from the Statement of Activities: charges for services, fees, and forfeitures for governmental activities; charges for services, fines, and forfeitures for business-type activities; and property taxes for governmental activities.			

For the unemployment rate and MHI, we used the same data sources as cited in Exhibit 4-2. Because the local unemployment rate is within 1% of the state unemployment rate,¹⁷ the City is mid-range on this indicator. As with the results using EPA’s Guidance, the City is weak on the MHI indicator since the local MHI is more than 10% below the state-level MHI. For the poverty rate, data from U.S. Census Bureau (2013b) indicates that the 18.5% of all families in Hamilton are below the poverty threshold, which is in the mid-range according to Montana’s Guidance. Based on data from U.S. Census Bureau (2013c), the City is weak on the “Low to Medium Income Percentage” (LMI) indicator, with 52.7% of families earning less than 200% of the poverty threshold.

Montana’s final Secondary Test indicator is the “Revenues, Taxes, and Fees Burden Index,” which is calculated as:

This metric is intended to reflect the government revenue burdens of the local population, and

¹⁶ This approach assumes that “the ability of a community to finance a project may be dependent upon existing household financial conditions within that community” (Montana DEQ, 2014).

¹⁷ Note that Montana’s alternate Secondary Test compares the local unemployment rate to the state, whereas EPA’s Guidance compares it to the national rate. In this case, however, either test yields a mid-range outcome for the City.

includes the following three revenue streams from the Statement of Activities in the 2014 AFR (City of Hamilton, 2015): charges for services, fines, and forfeitures for governmental activities (\$794,093); charges for services, fines, and forfeitures for business-type activities (\$2,239,090); and property tax revenues for governmental activities (\$1,715,630). These revenues sum to \$4,748,813. Dividing by MHI (\$26,023 in 2014\$; see Exhibit 3-1) and indexing by population (4,435 based on U.S. Census Bureau, 2013a) yields a metric value of 4.1, which is weak.

Exhibit 4-5 shows the Secondary Test using Montana DEQ Guidance. The City has a Secondary Test score of 1.4 using this alternative approach (compared with 2.3 using EPA's Guidance).

Exhibit 4-5: Secondary Score Metrics Based on Montana DEQ Guidance

Indicator	Result	Score	Data Source
Poverty Rate	18.5%	2	U.S. Census Bureau (2013b)
Low to Medium Income Percentage (LMI)	52.7%	1	U.S. Census Bureau (2013c)
Unemployment	4.90% [compared with 3.90% for the state]	2	June 2015 unemployment rate for Ravalli County and Montana from Bureau of Labor Statistics
Median Household Income	\$25,608 [compared with \$46,230 for the state]	1	U.S. Census Bureau (2013b)
Property Tax, fees and revenues ¹ divided by MHI and indexed by population	4.1	1	Tax, fee, and revenue data from City of Hamilton (2015)
Secondary Score²		1.4	
1. The "property tax, fees, and revenues" metric includes the following items from the Statement of Activities: charges for services, fees, and forfeitures for governmental activities; charges for services, fines, and forfeitures for business-type activities; and property taxes for governmental activities.			
2. Average of scores for the five indicators.			

5 Substantial Impact Analysis

Given an MPS of 2.2% (or higher, using alternative scenarios; see Section 3), and a Secondary Score of 2.3 or 1.4 (using EPA's 1995 Guidance or Montana's modified Guidance, respectively; see Section 4), the Substantial Impacts Matrix (Exhibit 5-1) indicates that impacts from the project are likely to be substantial. Further analysis would be needed to determine whether impacts would also be widespread.

Exhibit 5-1. Substantial Impacts Matrix

Secondary Score	Municipal Preliminary Screener		
	Less than 1%	1% to 2%	Greater than 2%
Less than 1.5	?	X	X
1.5 to 2.5	✓	?	X
Greater than 2.5	✓	✓	?

Source: U.S. EPA (1995)
X = impact is likely to be substantial
? = impact is borderline
✓ = impact is not likely to be substantial

6 References

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7 Appendix: Description of the Economic Guidance for Water Quality Standards

In order to demonstrate that there would be substantial and widespread economic and social impacts justifying a variance, the discharger must demonstrate that it would face substantial financial impacts, and that the affected community would have significant adverse impacts as a result (i.e., widespread impacts). EPA’s 1995 Guidance (U.S. EPA, 1995) outlines the specific steps that the discharger must follow to make these demonstrations. This appendix provides a brief overview of the Guidance as applicable to an entity in the public sector. For a more detailed description of the analysis, see U.S. EPA (1995).

First, to determine whether the pollution control project would entail a substantial impact to an entity in the public sector, there is a two part test. The first part of the test, called the Municipal Preliminary Screener (MPS), is a screening-level ratio designed to trigger additional tests or screen out the possibility of substantial impacts. Since municipalities will pass costs on to households and businesses, this screening is based on how household pollution control costs compare to household income. Generally, if the MPS is less than 1% (i.e., annual household pollution control costs would be less than 1% of median household income), there will not be a substantial economic impact. If the MPS is higher than 1%, then the impacts may be substantial and the discharger proceeds to the second part of the test.

The second part of the test involves calculating multiple indicators (e.g., bond rating, debt ratio, and tax collection ratio) designed to characterize the financial health and socioeconomic status of the community that will bear the costs of the pollution control. This is the Secondary Test.

Exhibit 7-1 shows the indicators used in the Secondary Test and the scores associated with them.¹⁸ The overall Secondary Score is the average of the indicators used.

Exhibit 7-1. Secondary Test Indicators in EPA’s Guidance

Indicator	Secondary Indicator Scores		
	Weak (Score of 1)	Mid-Range (Score of 2)	Strong (Score of 3)

¹⁸ In some cases, if data for a particular indicator is not available, the Guidance directs users to alternative indicators. See U.S. EPA (1995) for more details.

Bond Rating	Below BBB (S&P) Below Baa (Moody's)	BBB (S&P) Baa (Moody's)	Above BBB (S&P) Above Baa (Moody's)
Overall Net Debt as Percent of Full Market Value of Taxable Property	Above 5%	2% - 5%	Below 2%
Overall Net Debt Per Capita	Greater than \$3,000	\$1,000 - \$3,000	Less than \$1,000
Unemployment	More than 1% above national average	National average	More than 1% below national average
Median Household Income	More than 10% below state median	State median	More than 10% above state median
Property Tax Revenues as a Percent of Full Market Value of Taxable Property	Above 4%	2% - 4%	Below 2%
Property Tax Collection Rate	< 94%	94% - 98%	> 98%

The MPS and Secondary Test results are evaluated jointly, using the Substantial Impacts Matrix, as shown in **Exhibit 7-2**.

Exhibit 7-2. Substantial Impacts Matrix

Secondary Score	Municipal Preliminary Screener		
	Less than 1%	1% to 2%	Greater than 2%
Less than 1.5	?	X	X
1.5 to 2.5	✓	?	X
Greater than 2.5	✓	✓	?
Source: U.S. EPA (1995) X = impact is likely to be substantial ? = impact is borderline ✓ = impact is not likely to be substantial			

If the evaluation indicates that the pollution control project will place substantial economic burdens on the discharger, the next step is to determine whether the impacts will also be widespread in the surrounding community. This step involves estimating socioeconomic changes due to pollution control costs, such as loss of employment, changes in property values, and higher taxes. In this step, the analysis should consider the direct and indirect effects of control costs. Also, expenditures on pollution control costs are not likely to vanish from the community. These expenditures become business revenues and household incomes that can offset adverse financial impacts experienced by the affected entities.